

**Amendments to the Drawings:**

The attached sheet of drawings includes changes to FIG. 3. This sheet replaces the original sheet showing FIG. 3.

Attachments: Replacement Sheet  
Annotated Sheet Showing Changes

## REMARKS

The specification is amended. Drawing Figure 3 is amended. Claims 1-2 are pending. Claims 1-2 have been amended. New claims 3-6 have been added.

Reexamination and reconsideration are requested.

In the office action, dated April 19, 2006, the examiner rejected claims 1-2 under 35 U.S.C. § 102(b) as being anticipated by, or in the alternative under 35 U.S.C. § 103(a) as being obvious over, U.S. Patent No. 4,851,206 issued to Boudart et al. ("Boudart")

However, none of the amended claims is anticipated by or obvious over Boudart. The examiner's rejections are traversed, as is explained in more detail below.

### Re the Specification:

The continuity data contained in paragraph [0001] of the application has been updated. No new matter is added.

In paragraph [0069], line 22 is amended to more clearly set forth an embodiment of a method for producing molybdenum carbide of the present invention. No new matter is added.

FIG. 3 is amended and a replacement FIG. 3 is attached. Step 85 as shown in FIG. 3 is amended to more clearly illustrate an embodiment of a method for producing molybdenum carbide of the present invention. No new matter is added.

### Re the Claims:

Claim 1 has been amended to add the limitation MoC "comprising a surface-area-to-mass ratio of between about 11.5 to about 14 m<sup>2</sup>/g." No new matter is introduced as support for the amendment can be found in at least paragraph [0075].

Claim 2 has been amended to add the limitation Mo<sub>2</sub>C “comprising a surface-area-to-mass ratio of between about 5 to about 11 m<sup>2</sup>/g.” No new matter is introduced as support for the amendment can be found in at least paragraphs [0057] and [0077].

New independent claim 3 has been added. No new matter is added as support for the claim can be found in at least paragraph [0075].

New independent claim 5 has been added. No new matter is added as support for the claim can be found in at least paragraphs [0057] and [0077].

New dependent claims 4 and 6 contain the limitation “wherein said surface-area-to-mass ratio is proportionate to a surface-area-to-mass ratio of a precursor material as measured in m<sup>2</sup>/g.” No new matter is added as support for this limitation can be found in at least paragraph [0057].

#### Response to the Examiner’s Rejections

##### Re Rejections of Claims 1-2 Under 35 U.S.C. § 102(b)

##### Legal Standard

The standard for lack of novelty, that is, for anticipation under 35 U.S.C. § 102, is one of strict identity. To anticipate a claim for a patent, a single prior art source must contain all the essential elements of the patent claim. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 231 USPQ 81, 90 (Fed. Cir. 1986). Invalidity for anticipation requires that all the elements and limitations of the claims be found within a single prior art reference. *Scripps Clinic & Research Foundation v. Genentech, Inc.*, 18 USPQ2d 1001 (Fed. Cir. 1991). That is, “any degree of physical difference, however, slight, invalidates claims of anticipation.” *E.I. du Pont de Nemours & Co. v. Polaroid Graphics Imaging Inc.*, 10 USPQ2d 1579, 1585 (D. Del. 1989), *aff’d*, 13 USPQ2d 1731 (Fed. Cir. 1989). Furthermore, functional language, preambles and language in “whereby,” “thereby,” and

“adapted to” clauses cannot be disregarded. *Pac-Tec, Inc. v. Amerace Corp.*, 14 USPQ2d 1871 (Fed. Cir. 1991).

“[T]he disclosure of a genus in the prior art is not necessarily a disclosure of every species that is a member of the genus . . . . There may be many species encompassed within a genus that are not disclosed by a mere disclosure of the genus.” *Atofina v. Great Lakes Chem. Corp.*, 441 F.3d 991, 999 (Fed. Cir. 2006).

### Response

The examiner rejected claims 1-2 because Boudart discloses MoC and Mo<sub>2</sub>C. However, the examiner’s rejections are moot in light of the amendments to claims 1 and 2.

Claim 1 has been amended so that it now claims “MoC comprising a surface-area-to-mass ratio of between about 11.5 to about 14 m<sup>2</sup>/g.” Boudart discloses that face-centered cubic molybdenum is characterized by the formula  $\alpha\text{MoC}_{1-x}$ . Boudart discloses that a genus of “metastable metal carbides will generally have a specific surface area in the range of 5 to 300 m<sup>2</sup>/g, more usually 30 to 250 m<sup>2</sup>/g. Face centered molybdenum carbide will generally have a specific surface area from 15 to 250, more usually from 100-200 m<sup>2</sup>/g, while the face-centered cubic tungsten carbide will generally have a surface area of from 10 to 100, usually 40 to 80 m<sup>2</sup>/g.” Boudart, col. 6, lns. 21-38. Boudart does not disclose “MoC comprising a surface-area-to-mass ratio of between about 11.5 to about 14 m<sup>2</sup>/g” and the requirement of strict identity is not met. The disclosure of a genus of metastable metal carbides with a very wide surface area range does not amount to anticipation because the genus disclosed is very large, and perhaps, limitless as Boudart himself makes clear. *See Atofina*, 441 F.3d at 1000 (reference’s disclosure of an oxygen to methylene chloride ratio of 0.0001 to 0.1 % did not anticipate claimed oxygen to methylene chloride ratio of 0.1 to 0.5%, despite the slight overlap). In his table in Col. 3, Boudart specifically lists at least 8 metal carbides, 7 of which

contain variables in the generic chemical formulas. Moreover, he also discloses that elements from Groups 3b to 7b, 8, 3a, and 4a of the Periodic Table of elements, as well as the lanthanide and actinide series, also form metal carbides. Thus, the large genus of metal carbides cannot be said to anticipate the species of MoC, as claimed in claim 1. New claim 3 contains the same limitation as claim 1; therefore, for the same reasons explained immediately above, claim 3 is allowable over Boudart for the same reasons that claim 1 is allowable.

Claim 2 has been amended so that it now claims "Mo<sub>2</sub>C comprising a surface-area-to-mass ratio of between about 5 to about 11 m<sup>2</sup>/g." Boudart discloses two examples of what he calls thermostable molybdenum carbide (Mo<sub>2</sub>C) as having a surface area of either 12.5 or 51.0 m<sup>2</sup>/g. Therefore, Boudart does not disclose "Mo<sub>2</sub>C comprising a surface-area-to-mass ratio of between about 5 to about 11 m<sup>2</sup>/g" and the requirement of strict identity is not met. For the same reasons as set forth above, Boudart's disclosure of a large genus of metal carbides cannot be said to anticipate the species of Mo<sub>2</sub>C as claimed in claim 2. New claim 5 contains the same limitations as claim 2; therefore, for the same reasons explained immediately above, claim 5 is allowable over Boudart for the same reasons that claim 2 is allowable.

In addition, dependent claims 4 and 6 depend from claims 3 and 5, respectively, and are allowable at least for the reasons that claims 3 and 5 are allowable.

For these reasons, claims 1-2, as amended, and new claims 3-6 are allowable over Boudart.

#### Re Rejections of Claims 1-2 Under 35 U.S.C. § 103(a)

##### Legal Standard

The examiner has the burden of establishing a prima facie case of obviousness. *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998). "When a rejection [under 103]

depends on a combination of prior art references, there must be some teaching, suggestion or motivation to combine the references.” *Eccolochem, Inc. v. So. California Edison Co.*, 227 F.3d 1361, 1372 (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)). “Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. *Id.*, 227 F. 3d at 1372 (quoting *ACS Hosp. Sys. Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577 (Fed. Cir. 1984)). The Federal Circuit has specifically and directly outlawed “using the claimed invention itself as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention.” *In re Rouffet*, 149 F. 3d at 1357. As the Federal Circuit has emphasized, “[i]f identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue.” *Id.* at 1357. Thus, the suggestion or incentive to combine references cannot be based on the “naked invocation of skill in the art to supply a suggestion to combine the references cited in this case . . . .” *Id.* at 1359. Instead, the examiner “must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed.” *Id.* at 1357. That is a high standard indeed, since one of ordinary skill in the art “is also presumed to be one who thinks along the lines of conventional wisdom in the art and is not one who undertakes to innovate, whether by patient, and often expensive, systematic research or by extraordinary insights.” *Standard Oil Co. v. Am. Cyanamid Co.*, 227 USPQ2d 293, 298 (Fed. Cir. 1985). And, that “showing must be clear and particular.” *In re Dembiczak*, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999).

Where a prior art reference discloses a genus, but not the claimed species, the examiner must provide evidence of a suggestion or incentive from the prior art reference to select the claimed species from the disclosed genus. *In re Ochai*, 71 F.3d 1565, 1570

(Fed. Cir. 1995). *See also Ex parte Stewart*, 2001 WL 34369393 (Bd. Pat. App. & Interf. 2001) (examiner must consider size of the genus, express teachings of the prior art reference, teachings of structural similarity, teachings of similar properties, predictability of technology).

References “teach away” if they suggest that the line of development flowing from the reference’s teaching will not achieve the results sought by the inventor. *United States v. Adams*, 383 U.S. 39, 52 (1966) (“known disadvantages in old devices which would naturally discourage the search for new inventions may be taken into account in determining obviousness”); *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994) (citing cases). Teaching away is a significant factor in determining nonobviousness. *Id.*

#### Response

The examiner rejected claims 1-2 in the alternative as being obvious under § 103(a) over Boudart. Since claims 1-2 have been amended, the examiner’s rejections have been rendered moot.

As stated above, Boudart discloses a genus of metal carbides with surface areas of 5 to 300 m<sup>2</sup>/g, but no species of MoC or Mo<sub>2</sub>C in the claimed ranges of 11.5 to 14 or 5 to 11 m<sup>2</sup>/g, as claimed in amended claims 1 and 2, respectively. A prima facie case of obviousness cannot be made out for the reasons stated below.

First, Boudart’s disclosures of the species claimed, MoC and Mo<sub>2</sub>C, do not meet all the limitations of the claims. Claim 1 has been amended so that it now claims “MoC comprising a surface-area-to-mass ratio of between about 11.5 to about 14 m<sup>2</sup>/g.” Boudart discloses that face-centered cubic molybdenum is characterized by the formula  $\alpha\text{MoC}_{1-x}$ . Boudart discloses that “[f]ace centered molybdenum carbide will generally have a specific surface area from 15 to 250, more usually from 100-200 m<sup>2</sup>/g, while the face-centered cubic tungsten carbide will generally have a surface area of from 10 to 100, usually 40 to 80 m<sup>2</sup>/g.” This disclosure falls outside the claimed range for MoC of

between about 11.5 to about 14 m<sup>2</sup>/g. Similarly, claim 2 as amended claims “Mo<sub>2</sub>C comprising a surface-area-to-mass ratio of between about 5 to about 11 m<sup>2</sup>/g.” Boudart discloses two examples of what he calls thermostable molybdenum carbide (Mo<sub>2</sub>C) as having a surface area of either 12.5 or 51.0 m<sup>2</sup>/g. Therefore, Boudart does not disclose “Mo<sub>2</sub>C comprising a surface-area-to-mass ratio of between about 5 to about 11 m<sup>2</sup>/g.”

Boudart’s disclosure of a genus of metal carbides by itself cannot be used to make out a *prima facie* case of obviousness, because chemical arts are recognized as unpredictable. In addition, the size of the genus disclosed by Boudart is very large as explained above. Moreover, having disclosed for the species (MoC and Mo<sub>2</sub>C) surface area ranges that fall *outside* the claimed ranges, Boudart provides no suggestion or incentive to depart from those teachings to select a different range.

The fact that motivation is lacking in Boudart to choose a surface area range for MoC of about 11.5 to about 14 m<sup>2</sup>/g and for Mo<sub>2</sub>C of about 5 to about 11 m<sup>2</sup>/g is highlighted by the fact that Boudart teaches away from the claimed invention. For example, with respect to Mo<sub>2</sub>C, Boudart teaches the importance of “greatly enhanced specific surface area” over 12.5 m<sup>2</sup>/g for “conventional” product. Even 12.5 m<sup>2</sup>/g is outside of the claimed ranges.

Thus, the only way that one of skill in the art would know to pick a surface area range falling *outside* of the ones that Boudart specifically discloses for MoC and Mo<sub>2</sub>C is by using the present application as a roadmap, which is not permitted.

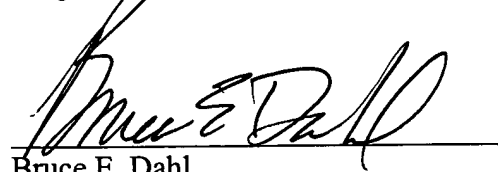
New claim 3 contains the same limitation as claim 1; therefore, for the same reasons explained immediately above, claim 3 is allowable over Boudart for the same reasons that claim 1 is allowable. New claim 5 contains the same limitation as claim 2; therefore, for the same reasons explained immediately above, claim 5 is allowable over Boudart for the same reasons that claim 2 is allowable.



Dependent claim 4 depends from claim 3 and is allowable over Boudart at least for the reasons that claim 3 is allowable. Similarly, dependent claim 6 depends from claim 5 and is allowable over Boudart at least for the reasons that claim 5 is allowable.

The applicants believe that all of the claims now pending in this patent application, as amended and described above, are allowable and that the issues raised by the examiner have been addressed. Therefore, the applicants respectfully request the examiner to reconsider the rejections and to grant an early allowance. If any questions or issues remain to be resolved, the examiner is requested to contact the applicants' attorney at the telephone number listed below.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Bruce E. Dahl", is written over a horizontal line.

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FIG. 3

